PUB 2011
High Mountains
Data-sparse regions
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How can predictive approaches be improved?

- Catchment characterization
- Scale influences
- Glacier-related processes
- Phase of precipitation
Catchment characterization (1)

- Grouped response unit (GRU) delineation
  - elevation
  - aspect (radiation loading)
  - land cover
  - underlying geology
  - landscape dependence
  - scale influences (e.g. representation of blowing snow or avalanching)
  - parsimony
Catchment characterization (2)

- HRU delineation
  - storage, connectivity, thresholds
  - subjective
  - testable?
Catchment characterization (3)

- Classification
  - Geology!
Scale considerations

♣ How to deal with information at different spatial resolutions: degrade higher resolution?
♣ High spatial resolution = pseudo-information?
Glacier-related processes

- Glacier dynamics
  - diurnal
  - seasonal
  - multi-year
  - transient boundary conditions
  - glacier response time as a similarity metric
- Debris-covered glaciers and ice-cored moraines
- Volume-area scaling vs. dynamic modelling
Phase of precipitation

Air temperature not always a reliable or transferable discriminator for rain vs snow

Need new observations and analysis of existing data sets
How to transfer information from data-rich to data-poor situations

- Catchment characterization
  - Thermal regime
  - Seasonality of precipitation
  - Land cover
  - Topographic complexity

- Models can be transferred if they incorporate the correct physics

- But, highly parameterized physics-based models can be pathologically sensitive to errors in input variables
How to transfer information from data-rich to data-sparse situations (2)

♣ Research basins are important for
  ♣ developing and testing simplified representations
  ♣ determining appropriate scales for process representation
How to transfer information from data-rich to data-poor situations (3)

- Precipitation is the most critical input yet is the least well characterized, even when gauged
  - Why not just install a stream gauge – the PUB problem then disappears?
  - Back-calculate accumulated winter precipitation based on SWE reconstruction
How to transfer information from data-rich to data-poor situations (4)

♣ Need to maintain data-rich infrastructure
♣ But short-term data richness can be useful
♣ Need to consider why, where and how accurate PUB applications should be: remember the user!